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ParkApp - Online Parking Spot Booking Application

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Abstract: ***Today with the rising number of vehicles there is an acute shortage of parking spaces in cities and there are traffic congestions occurring only due to irresponsibly parked vehicles. Furthermore, there are parking spaces available in cities, in shopping complexes and shops, which people are not aware of or are not available for the public. With our application we aim to solve the parking space issues by allowing shops and other institutions to share their available parking slots with people. Shopping complexes and other institutions can register their parking slots on our app as available for parking and users of the app can search for parking spots available near places they intend to visit and book it for the desired time period at a certain predetermined rate. Thus unused parking slots will be made available to the general public and people can easily find available parking slots and simply book them for as long as they might be needing it. Thereby, reducing the issue of parking spot availability and traffic congestion due to careless and unlawful parking.***

Keywords: ParkAppVerifier, ParkApp, Flutter Apps, Flutter UI, Google FireBase, Online Parking Spot Booking, Mobile Application.

I. INTRODUCTION

With this application we aim to bring out a solution to the problems caused due to unavailability of parking spaces by letting people rent their unused space to the application's users for parking their vehicles, with an incentive received from the application whenever a user parks at their space. The app will help in reducing the traffic congestions and road mishaps caused due to unlawfully parked vehicles thereby aiding in enhancing road safety. The application allows the users to look for parking slots nearby or at places they are visiting and enables them to book a spot for their vehicle, for however long they will be needing the spot for using any of the payment options available in the application. Once the user arrives at the booked spot, he/she scans a QR code to start the timer. Failing to do so within 15 minutes from the start of the booking time, may cause the booking to be cancelled and the user losing the booking amount. After the purpose of visit is over the user can leave the spot and after the booked time elapses the booking is closed. There is also a verifier app, which is for verifying the parking spot. If a host desires to rent a spot for parking on the app, he needs to list the spot on the app with the necessary details, after which the spot will be verified by a certified Verifier (a person appointed by the ParkApp for verification of parking lots), using the ParkAppVerifier App. Once the listed parking spot has been verified by a verifier, the parking lot is made available for the users for booking.

II. PROBLEM DEFINITION

Our main purpose behind pursuing this idea of developing an application, where users could book a parking spot just like booking movie tickets, is to save people's time and fuel and also relieve the congestion on city roads. With the help of this application users can enter their required location and based on that the app shows various parking lots nearby. The user can then check for the availability of a spot at the location at the desired time and for the desired duration and if available he can book it. Users also get the pricing details of various parking lots in the area. The owners/hosts of the parking slot can also see this app as an extra source of revenue wherein they can rent out their unused parking space. The complete implementation of this project is explained in great detail in the further sections of this paper.

III. OBJECTIVE OF THE PROPOSED SYSTEM

This proposal is aimed at development of an application in which the users could book their desired parking spot. The hosts and the users have a common application connected to a central database which is managed by the admin. The verifier app is also linked to this central database and updates the verified parking spots available to the users. The main functions would include:

A. Getting various parking lots data
B. Login authentication for users of the app
C. Parking availability
D. Centralized server/database
E. Improving the user experience.

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IV. SYSTEM ARCHITECTURE

It uses a client-server architecture, which is a distributed system, consisting of both client and server software. The client process request for a service from the server, while the server process always waits for request from any client and provide service to the client.

The major components of the architecture are: Mobile App, Verification App, Central Database, Admin, Users, Owners/Hosts.(see 'Fig. 1')

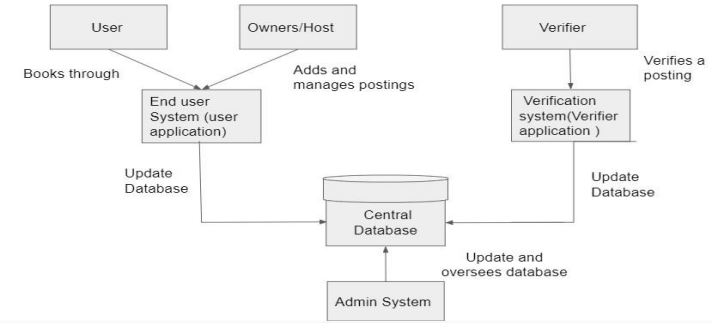

Fig. 1. System Architecture

V. SYSTEM WORKING

A. Working Mechanism

The user has to first sign up into the application which registers the user onto the central database and thereafter the user can log onto the application wherein available spots are shown. The user selects the suitable spot and mentions the time for how long he might be needing the spot and confirms the booking by making payment for the spot online. The user upon reaching the designated parking spot in the booked parking lot he/she scans a QR code placed there in order to begin the timer. The user must reach the parking spot within 15 minutes of the booked time in order to prevent auto cancellation. The user after his purpose of visit is over can leave the parking spot. The user also has facilities for viewing his upcoming bookings and previous bookings and also save postings that he wishes to reuse or review. The user also has an option to chat with the host of the parking lot he has just booked in case he requires some assistance. Another feature of the app is that the users can rate and review hosts and postings through the mobile application. The application also has a hosting dashboard which lets the users to create a posting on the app (i.e. add their parking lot) and also modify certain things related to their already existing postings. It also provides them a platform to view upcoming bookings and their previous bookings and earnings. The other module in this software package is the verifier app, which is used by company appointed verifiers to verify that the newly added postings are genuine and that necessary documents are present with the owner. Only after verification by a verifier, will a posting be available for other users to view or book.

B. Functionality of the Modules

1) Mobile App for Users

a) Sign In and Sign Up: The user can Sign In and Sign up into the application for the booking of parking spots and the authorisation is managed by the Google's Fire Auth Service.

b) Find Parking Spots: The user can select a spot from the various parking spots displayed on the application's Explore page. He can also make searches based on the name of the parking lot or the city which the user is intending to visit.

c) Parking Spot Details: Once the user has selected a parking spot, the spot's details are shown including the rate, a brief description, address, location on the map as a placemarker, rating, host details, review form and reviews. The user can then select the desired duration for which he/she will be needing the parking spot and then confirm the booking with payment.

d) QR based Check In: Once the user has completed the payment, the user on reaching the spot scans the QR code at the designated spot which checks the user in and initiates the timer. Failing to check in, within 15 minutes of the booking may lead to cancellation of the booking.

e) Managing the spots: The owners can Sign into the App and manage the active parking spots and also view the current bookings of the parking spots and the total revenue from the parking app.

f) Real-time Data: The Application continuously syncs with the FireBase database (Firestore), providing data to the users and the owners and also enables the use of flags for avoiding the various race conditions.

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2) Mobile App for Verifiers

a) Sign in: The verifiers can sign in to the application with the email id and password provided to them, for verifying parking spots and the authorisation service is handled by Google's Fire Auth.

b) Verifying the spots: The verifiers ensure the validity of postings by visiting the registered spots and verifying the genuinity of the posting and that all documents are in place. After the completion of the verification process by the verifier the posting is available on the user application for booking by the other users.

c) Data Backup: Both the apps keep backup of the data regularly. The backup is saved on the Firestore. The backup will be taken automatically based on a regular interval. The admin can restore the database from the backup which is stored on the Firestore, if the server crashes.

C. Setup Representation

A typical representation or the block diagram of the application package can be seen in fig. 2

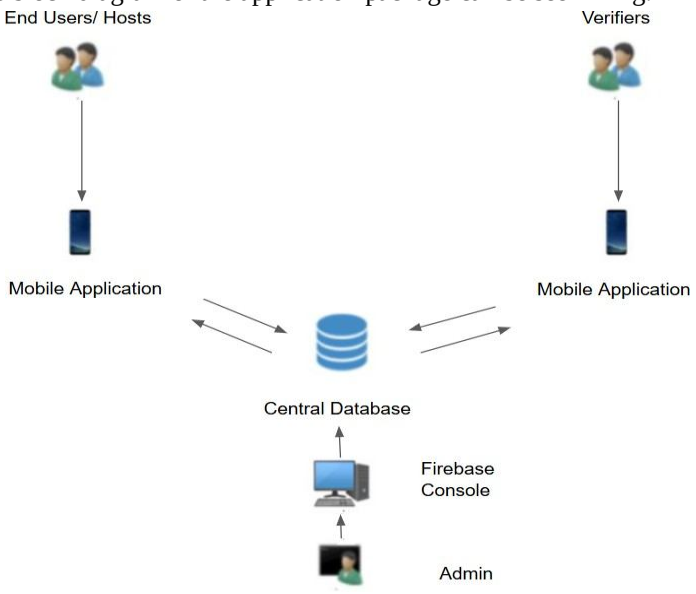

Fig. 2. Block Diagram

VI. SIGNIFICANCE

One of the major significance of this application is that, it is easier to find parking spaces and thereby we can reduce illegal parking's and traffic congestion occurring in the cities. It is a cost- effective system, because only a nominal fee is charged for the customer for the parking purpose. It provides a platform for parking lot owners to rent out their extra parking spots thereby benefiting the owners, who rent their parking slots. The application will effectively reduce road mishaps happening due to unlawfully parked vehicles. The application will also enable the users to park their vehicles without worrying about their vehicle safety.

VII. CONCLUSIONS

This application is a solution for the current parking space crisis in cities ,made possible by people willing to share their available space with others to park their vehicles .The application will help in reducing traffic congestions and other road mishaps caused due to wrongfully parked vehicles and also encourages people to be smart citizens and to follow the traffic guidelines as they will be motivated to park their vehicles safely ,as parking spaces will be made much easier to find and be made available to them at a nominal fee .The application will thereby aid the users to find and book a parking spot without having to personally search for available spots and hence saving their time and fuel as well.

VIII. FUTURE WORK

Furthermore, using this system we could study the congestion caused in cities and provide more parking lot services thereby reducing the traffic problems .Also we could include the pass system for the customers that very often use the parking by studying the data collected the app and the website .And also this data collected could be used for security purposes .Also automatic booking suggestions via the application can be included thereby improving the user experience furthermore.

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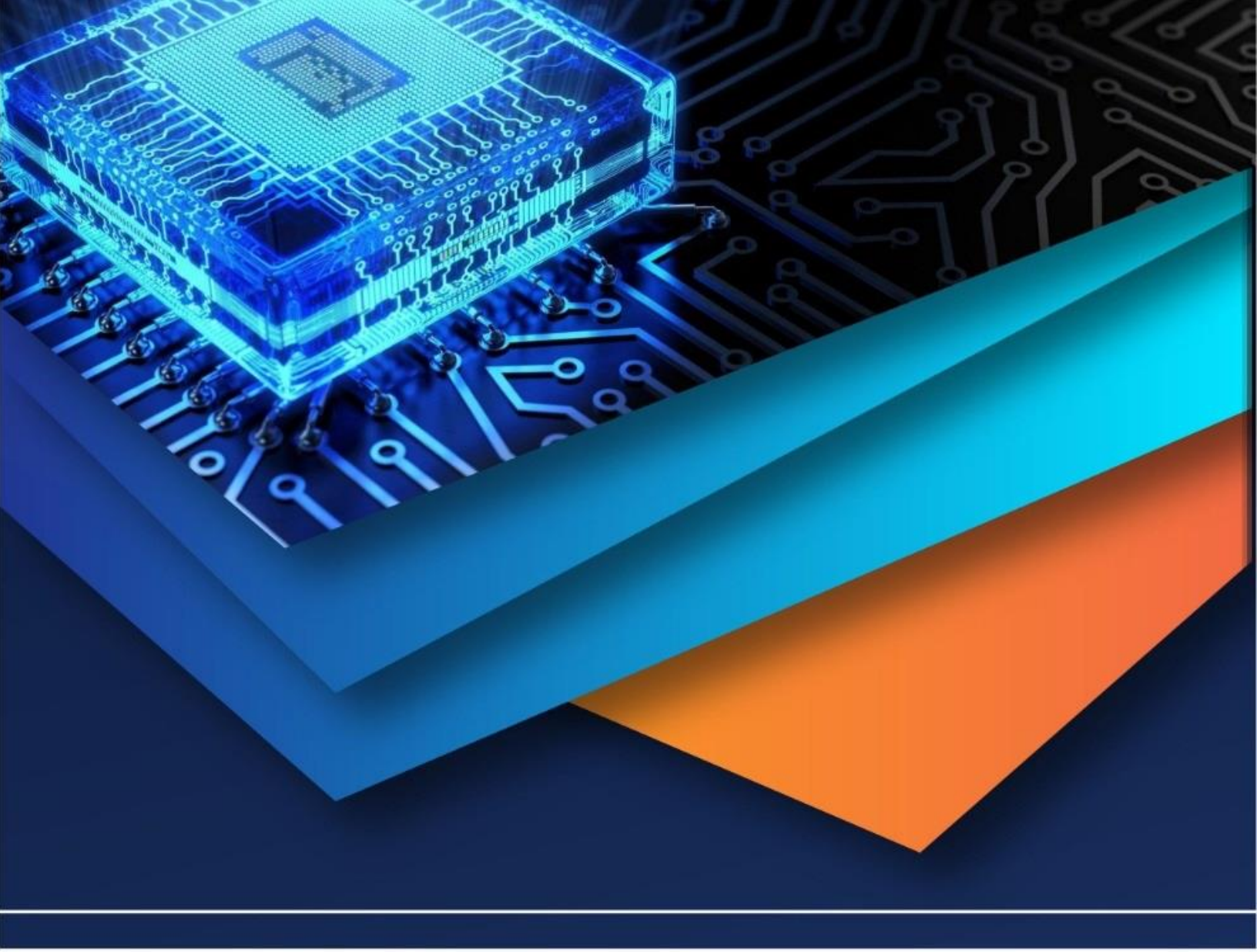

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